

# Fittings Introduction



## Fittings

Alfa Laval, the leading manufacturer and innovator for sanitary fluid handling products, is your complete source for specialized fittings and tubing required in food, dairy, beverage, biotechnology and pharmaceutical process applications. Smooth, crevice-free interiors and secure, self-aligning joints are characteristic of our Tri-Clover® brand fittings. Each offers superior corrosion-resistance and unmatched service life. Tri-Clover brand fittings are designed and manufactured to ensure dimensional accuracy and structural integrity, making them easy to install. Tri-Clamp® and Tri-Weld® Fittings are part of Alfa Laval's product line.

Tubing, also available from Alfa Laval, is manufactured to our stringent specifications, making it a perfect match for the Tri-Weld Fittings. Choose from a complete range of tube sizes and surface finishes.

## Bio-Pharmaceutical Fittings

Alfa Laval is proud to present their line of fittings designed for use in the Pharmaceutical and Bio-Technology Industries. This line consists of Tri-Clover parts with either Tri-Weld ends suitable for use with orbital welding equipment or self-aligning Tri-Clamp end connections.

Alfa Laval offers a full line of Bio-Pharm Fittings that are manufactured in compliance with the current revision of the ASME BPE Standards. Fittings that comply with the ASME BPE are designated by the "B" prefix in the model number and the "Px" finish code at the end of the part description.

## Features and Benefits of Bio-Pharmaceutical Fittings

Full Traceability - Material Test Reports (MTR's) are included with each shipment. MTR's are also available in an electronic file format upon request. Permanent markings on all components allow a quick identification of all Heat numbers, Material Grade, Surface Finish Designation to the BPE Standard (SFF1 or SFF4), and Manufacturer's logo.

Wide Range of Surface Finish offering - Alfa Laval offers a range of Mechanical Polish as well as Electropolish finishes. Mechanical polishing is achieved by using a progressive series of abrasives, from low to high grit. This provides a consistent internal finish for optimal cleaning. Electropolishing is a further process that promotes a Chromium enriched surface layer that maximizes corrosion resistance as well as minimizing potential bacterial buildup on the surface.

Metallurgy - Incoming raw material goes through a stringent inspection process to ensure its chemistry will be ideal for both weldability and electropolishing.

Quality Control Methods - Our manufacturing facilities operate under an approved ISO 9002 quality standard. Wall thickness integrity is maintained through the use of fabrication grade minimum wall tubing for all cold-formed tubular products. After cold forming, our tube product is resized to ensure that the ovality falls within the prescribed BPE tolerances. End facing is provided with a machined square-cut method. This allows for the most accurate and consistent orbital weld result. All fittings are put through 100% visual inspection. All tolerances are inspected with calibrated equipment. Surface finish is inspected with a calibrated profilometer to ensure the Roughness average (Ra) maximum is not exceeded.

Packaging and Labeling - All BPE items are individually capped and bagged in clear 6 mil. Poly bags or shrink-wrap. All product is labeled with a bar code, product information and manufacturing date. This provides easy identification and ensures that the product arrives to the job site clean and ready for welding.



# Fittings Introduction



Sanitary fittings identified with this symbol on the following pages are accepted as meeting the 3A sanitary standards by the appropriate committees of the International Association of Milk, Food and Environmental Sanitarians, U.S. Public Health Service, and Dairy Industry Committee.

Note: Items Identified with the 3A symbol in this catalog are authorized to carry the symbol only for those versions that have a polished ID surface of 32 microinch Ra or better (#7, #3, or biopharm finishes).

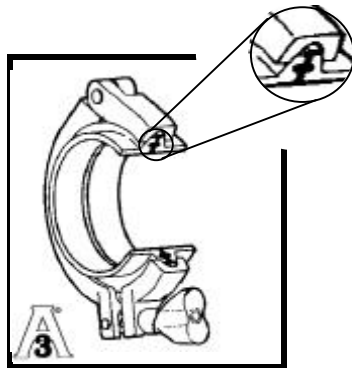
Note: Catalog product presentations including cataloged dimensions, designs and specifications are representative of product availability at time of publication only. Actual geometry, dimensions, and designs are subject to design and manufacturing changes without notice.



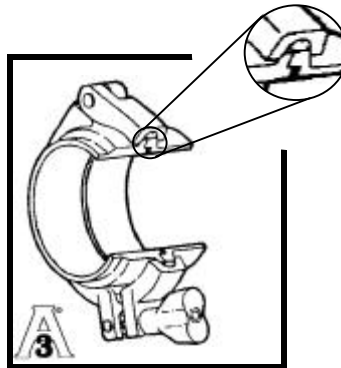
# Connection Types



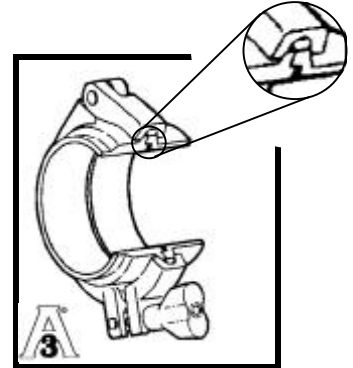
## Clamp Fittings



Tri-Clamp



HDI-Line

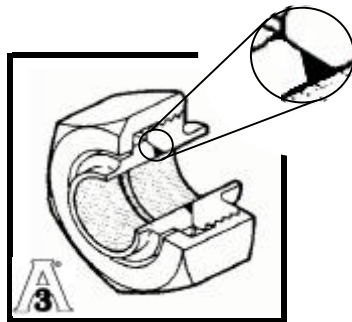


H-Line

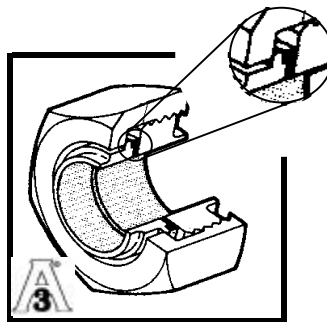
A connection is made up of a plain ferrule, a clamp, and a gasket. Tees, elbows and reducers are available with Tri-Clamp connections. All three styles are in compliance with 3A standards for C.I.P. (clean in place). The three types of clamp fittings are designed for use in Food, Dairy, Pharmaceutical and Chemical Industries.

- Tri-Clamp connections are the industry standard, having nueter-style ferrules to simplify design and installation.
- H-Line and HDI-Line male/female ferrules self-align during tightening so joints are quick and easy to assemble or take apart.
- H-Line uses the same series of clamps as the Tri-Clamp.

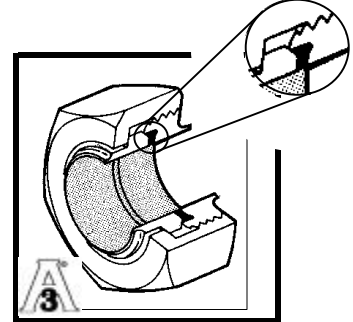
## Threaded Fittings



Bevel Seat



John Perry



DC

A connection is made up of a plain ferrules, a threaded ferrule, a nut and a gasket. The faces on Bevel Seat fittings are angled to create a metal to metal sealing surface. A John Perry fitting consists of a flat-faced threaded ferrule, a flat-faced plain ferrule and a profiled gasket. These joints are particularly useful with swing connections and flow diverter panels. A DC fitting utilizes the Bevel Seat plain ferrule and a threaded ferrule with a grooved face to retain a gasket. The three types of threaded fittings are designed for use in the Food, Dairy, and Beverage processing industries. Bevel Seat Joints are in compliance with 3A standards for manual cleaning. Both John Perry and DC fittings are in compliance with 3A standards for C.I.P. (clean-in-place).

- Bevel Seat
- John Perry
- DC

# Ordering Information



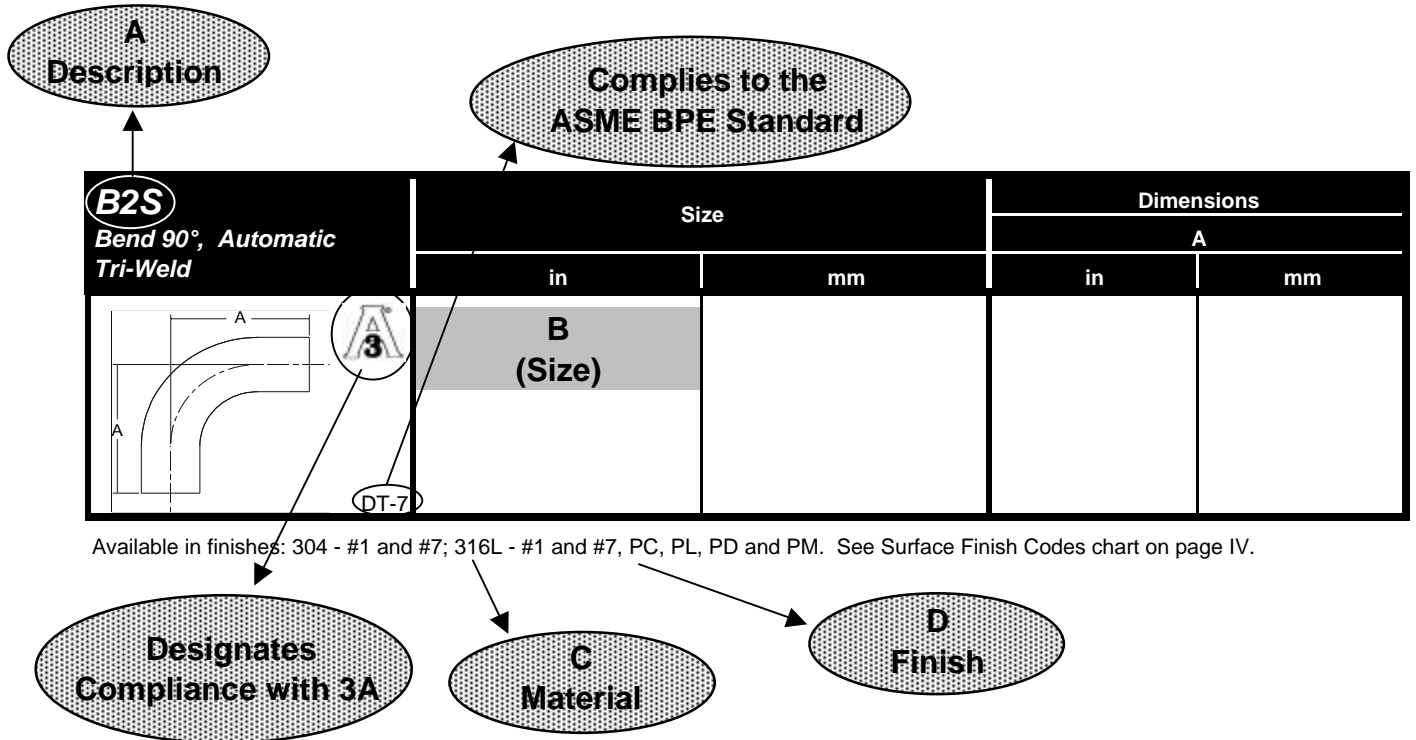
When ordering, please specify the complete part number including: description, size, material and surface finish

Example: 

<b>B2S - 1 - 316L - 7</b>
---------------------------

<b>A - B - C - D</b>
----------------------



## Surface Finish Codes

Finish Code	ID or Product Contact Surface			Polishing Method	OD or Product Noncontact Surface
	Maximum Surface Roughness (Ra)		ASME BPE Finish Code		
	Microinches (μ-inch)	Micrometers (μm)			
1			----	Unpolished	Unpolished
3	32	0.8	----	Mechanical Polished	Unpolished
7	32	0.8	----	Mechanical Polished	Polished to Ra, 32μ-inch / 0.8μm
PC	20	0.5	SFF1	Mechanical Polished	Unpolished
PD	15	0.4	SFF4	Mechanical Polished and Electropolished	Unpolished
PL	20	0.5	SFF1	Mechanical Polished	Polished to Ra, 32μ-inch / 0.8μm
PM	15	0.4	SFF4	Mechanical Polished and Electropolished	Polished to Ra, 32μ-inch / 0.8μm

# Technical Information



## Service Rating of Tri-Clamp® Connections

### Service Ratings\* (PSI)

Size Tube OD	½ in and ¾ in	1 in and 1½ in	2 in	2½ in	3 in	4 in	6 in
<b>13MHLA</b>	<b>(Screw tightened to maximum)</b>						
at 70°F	--	150	150	150	150	100	--
at 250°F	--	125	125	125	125	75	--
<b>13MHHM</b>	<b>(Wing nut tightened to 25 in. lb. of torque)</b>						
at 70°F	--	500	450	400	350	300	150
at 250°F	--	300	300	200	195	150	75
<b>13MHHS</b>	<b>(Wing nut tightened to 25 in. lb. of torque)</b>						
at 70°F	2200	600	550	450	350	300	--
at 250°F	1200	300	275	225	175	150	--
<b>13MHP</b>	<b>(Bolts tightened to 20 ft. lb. of torque)</b>						
at 70°F	--	1500	1000	1000	1000	800	300
at 250°F	--	1200	800	800	800	600	200
<b>A13MO</b>	<b>(1-3" nuts tightened to 20 in. lb., 4" to 30 in. lb.)</b>						
at 70°F	--	500	350	300	200	100	75
at 250°F	--	250	200	150	100	100	50
<b>A13MHM</b>	<b>(Wing nut tightened to 25 in. lb. of torque)</b>						
at 70°F	--	500	450	400	350	300	150
at 250°F	--	300	250	200	175	150	75

\* Service ratings are based on hydrostatic tests using standard-molded Buna-N material gaskets, with proper installation of ferrules, assembly of joints and absence of shock pressure. Contact Alfa Laval for service of other type and material gaskets, and for ratings at higher temperatures. All ratings shown are dependent upon related components within the systems and proper installation. For temperatures above 250° F, we recommend using only 13MHP clamps. This information is only valid if Alfa Laval clamps, ferrules, and gaskets are used.

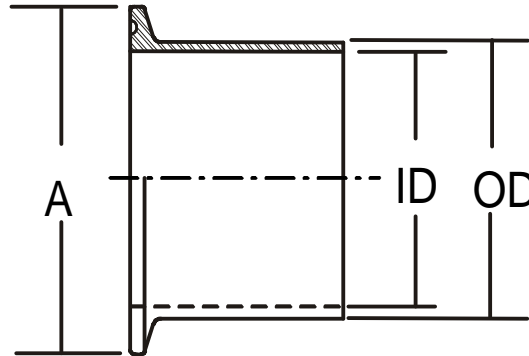
### Tri-Clamp® Gasket Materials

Characteristic	Buna-N (U)	EPDM (E)	Fluoro-elastomer (SFY)	Silicone (X)	PTFE (G)
<i>Original Physical Properties</i>					
Hardness, Shore A	70	70	70	70	---
Tensile Strength, psi	1875	1650	1212	1340	---
Elongation, %	340	317	272	260	---
Temperature Range	-65 to 200° F	-60 to 300° F	-20 to 350° F	-40 to 450° F	-40 to 200° F
Acid Resistance	Good	Good to Excellent	Good to Excellent	Poor to Good	Good to Excellent
Alkali Resistance	Fair to Good	Good to Excellent	Poor to Good	Poor to Fair	Excellent
Resistance to Fats/Oils	Good to Excellent	Poor	Good to Excellent	Poor to Good	Excellent
Abrasion Resistance	Excellent	Good	Good to Excellent	Poor	Fair
Compression Set Resistance	Good	Fair	Good to Excellent	Good to Excellent	Cold Flows

# Technical Information



## Basic Dimensions of Tri-Clamp® Connections for Sanitary OD-Tubing



OD Outer Diameter (Inches)	ID Inner Diameter (Inches)	Wall Thickness (Inches/Gauge)	A Ferrule Face (Inches)
1/2	0.37	0.065 / 16 ga.	0.984
3/4	0.62	0.065 / 16 ga.	0.984
1	0.87	0.065 / 16 ga.	1.984
1 1/2	1.37	0.065 / 16 ga.	1.984
2	1.87	0.065 / 16 ga.	2.516
2 1/2	2.37	0.065 / 16 ga.	3.047
3	2.87	0.065 / 16 ga.	3.579
4	3.87	0.083 / 14 ga.	4.682

### Sanitary Tube Information

Tube OD Inches	Tube ID Inches	Wall Thickness Inches	Volume Gal/100 ft	Weight Dry Lbs/100 ft	Weight with Water Lbs/100 ft	Flow (GPM) at a Mean Velocity		
						5 fps	7 fps	10 fps
1/2	0.37	0.065	0.56	30.6	35.3	1.7	2.3	3.4
3/4	0.62	0.065	1.57	48.2	61.3	4.7	6.6	9.4
1	0.87	0.065	3.09	65.8	91.5	9.3	13	19
1 1/2	1.37	0.065	7.66	100.9	164.8	23	32	46
2	1.87	0.065	14.27	136.1	255.1	43	60	86
2 1/2	2.37	0.065	22.92	171.2	362.4	69	96	138
3	2.87	0.065	33.6	206.4	486.7	101	141	202
4	3.834	0.083	59.97	351.8	851.9	180	252	360
6	5.782	0.109	136.39	694.7	1832.2	409	573	818
8	7.782	0.109	247.07	930.6	2991.1	741	1038	1482



**CSI** 417.831.1411  
csidesigns.com



# Technical Information



## Pipe Schedule and Chemical Composition

### Schedule 5 Pipe

Size	OD Inches	ID Inches	Wall Thickness
1/8	0.405	0.335	0.035
1/4	0.540	0.442	0.049
3/8	0.675	0.577	0.049
1/2	0.840	0.710	0.065
3/4	1.500	0.920	0.065
1	1.315	1.185	0.065
1 1/4	1.660	1.530	0.065
1 1/2	1.900	1.770	0.065
2	2.375	2.245	0.065
2 1/2	2.875	2.790	0.083
3	3.500	3.334	0.083
3 1/2	4.000	3.834	0.083
4	4.500	4.334	0.083
5	5.563	5.345	0.109
6	6.625	6.407	0.109
8	8.625	8.407	0.109

### Chemical Composition %

	304	316L
C	0.080	0.030
MN	2.000	2.000
P	0.045	0.045
S	0.030	0.030*
Si	1.000	1.000
Cr	18.0-20.0	16.0-18.0
Ni	8.0-13.0	10.0-14.0
Mo	-	2.0-3.0

\* The sulfur content for 316L ASME BPE fittings is 0.005-0.017% for all weld ends.